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ABSTRACT

In order to effectively change the Civil Service Commission qualification and classification standards for Librarian and Technical Information Services professional positions, these standards must be examined with regard to current conditions as well as future developments in technology and socioeconomic and political trends that will affect staffing. A totally new approach to staffing guidelines is needed because of the increased importance of the information as a resource and management tool and the continuing expansion and rapid change in technology. Each library/information center function must be examined as it is covered in the present standards and as it has changed and will develop in the future. Based on these evaluations, it is recommended that the definition of librarianship/information service be broadened, and that the two separate professional series be combined since the reasons for their former separation are no longer valid. In addition, there should be continuously updated hierarchies to allow for a combination of subject and function education and experience. The precision of a match between the job and applicant would be increased through the use of sophisticated information handling techniques. A panel of information professionals would monitor classification/qualification actions and administer the guidelines. (Author/CWM)

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STUDY OF FEDERAL LIBRARY/INFORMATION SERVICE STAFFING

AS AFFECTED BY

CLASSIFICATION AND QUALIFICATION STANDARDS

Prepared for

The Federal Library Committee

BEST COPY AVAILABLE

by

Winifred Sewell

1978

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EXECUTIVE SUMMARY

Directors of federal libraries/information centers agree that they are hampered in finding and retaining professional personnel because Civil Service Commission standards are outdated in the two professional series, GS1410 (Librarian) and GS1412 (Technical Information Services). This study makes recommendations for new standards and emphasizes that a totally new approach to staffing guidelines is needed because of the increased importance of information as a resource and management tool and the continuing expansion and rapid change in technology.

Technological changes -- more powerful and cheaper computing, better and less expensive telecommunications, and increased availability and use of microforms -- cause the librarian/information specialist to move into nontraditional roles. Some socioeconomic changes that also influence library/information center operation are: the rapid increase of available information itself, the pressures of consumerism, increased emphasis on the social aspects of science and technology, and advanced management techniques Most important, increasing costs have made necessary sharing of various aspects of library/information center operation at the same time that technological networking capabilities have made it possible.

In a table, each library/information center function is examined as it is covered in the present standards and as it has changed and will develop in the future, with recommendations for specific new standards. For example, today the traditional cataloger may display on a terminal the basic catalog entry, shelf class and index headings for a book. He can accept or adapt the entry and order the catalog cards he needs, or -- if there is no entry -- he may record his own cataloging for the card order and for use of others. Thus the routines in his former work are speeded, but the impact of the original entries he prepares extends far further than his own organization. The use of networks and resource sharing reduce the quantity of professional work per item handled, but increase the function's overall impact.

All traditional information officer/librarian functions are changing rapidly. They are moving along an information transfer cycle from the more routine processes of collecting and organizing information to the more sophisticated ones involved in its assimilation and use -- sifting, interpreting, educating, evaluating, promoting -- as demonstrated in such job titles as clinical librarian, information counsellor, information exploiter, or information broker. Consequently, increased subject knowledge and new behavioral and communications skills are required.

The rapid change in traditional information functions also causes an order-of-magnitude increase in the responsibility of

the library/information center manager. With the many alternatives available for accomplishing his service objectives, he must not only manage information, but also use information to manage.

Major problems in the process of matching an applicant to a job are:

1) The individual manager must find a means of updating position descriptions. Any written before 1975 are now almost certainly out of date.

2) Classification by the agency personnel officer is rigid because in the typical situation he sees fewer than a half dozen actions in the two series each year.

3) Guidelines for classification under the present standards -- and even under the new Factor Evaluation System -- do not allow for enough discrimination among requirements. The need for both subject and functional background is in basic conflict with the principle that the primary or major qualification is the controlling one. The depth of knowledge of the specialist, indicated by a Ph.D. degree, is clearly recognized, but breadth of knowledge is not credited, even though a generalist who has two B.S.'s or two M.S.'s is often more valuable than the specialist in an information center/library setting. The field librarian in a specialized agency subdivision must frequently have unique qualifications that merit recognition equal to that in the agency's central library.

4) The qualification process is not precise enough to sift out the best applicant from among others who have similar general backgrounds.

5) Serious blocks impede recruiting from outside the federal government although such recruitment is needed because there is a limited number of people throughout the country with a given specialized combination of subject and information science knowledge. An excepted agency librarian estimates that three fourths of the people he recruited to his professional library staff during the past ten years came from outside the government, whereas in nonexcepted agencies the figures appear to be reversed.

Even though nearly half of the Gross National Product is derived from information activities, there are only around 4500 people in the two basic information series -- GS1410 and GS1412. Information activities are classified in a number of other series although many of them are ones for which librarians and information specialists are uniquely trained. The definition of the librarian/information specialist in the government must be substantially broadened so that it includes at least ascertaining information needs and behavior and designing, implementing, operating and managing systems, services and products responsive to the needs. Under this definition could be encompassed Civil Service series presently involved with such functions as public information and publication, medical records, operations research and many others.

In addition to the recommendation to broaden the definition of librarianship/information science, it is specifically recommended that the GS1410 and GS1412 series be combined since the reasons for their former separation are no longer valid. To allow for the variety of subject and functional backgrounds needed, use of sophisticated information handling techniques is endorsed for increased precision in matching an applicant to a job. Hierarchies are suggested in four areas: subject knowledge, information science knowledge, general skills, and institutional settings in which experience has occurred, with primary emphasis on the first two. For instance, a subject hierarchy might have biological sciences at the top and work down through medicine or agriculture to health administration or soil science. Educational requirements would consequently go to the course level rather than the degree level.

Once such hierarchies were established, they would be continuously updated through guidelines for their application which would in effect replace traditional standards as an administrative tool. A panel of information professionals would monitor classification/qualification actions and administer the guidelines.

Further study is needed to establish subject and function hierarchies, to obtain information for broadening the definition of library/information science and their placement in Civil Service series, to provide methodology for institution and use of the guidelines for administering the system, and to study and monitor the educational programs that are essential to a smoothly functioning recruitment system. More peripheral areas of further study are: job titles, role of library technicians (GS1411 series), position descriptions, and the effects on library/information centers of the Federal Personnel Management Project.

TABLE OF CONTENTS

1. Introduction 1

2. The Problem 4

3. Analysis of Current and Future Library/Information Center Functions . . . 7

   Technological Changes 8

   Socioeconomic Changes 10

   Impact of Technological and Socioeconomic Changes on Information Functions/Conclusions from Table 1 11

4. Matching the Application to the Job and Civil Service Commission Plans for Change in the Process 14

   Position Descriptions 15

   Too Few Library/Information Center Personnel Actions 15

   Guidelines for Classification and the Factor Evaluation System 17

   The Qualification Process 18

   Impediments in Recruiting from Outside the Federal Government 21

5. Recommendations

   Broaden the Scope of the Standards to Include a Broader Definition of the Field . 22

   Eliminate the Distinction between and Combine the GS1410 and GS1412 Series . . . 27

   Emphasize the Need for a Combination of Subject and Function Education and Experience . . 29

   Increase the Precision of Match between the Job and the Application through Use of Sophisticated Information Handling Techniques . . 30

TABLE OF CONTENTS (Continued)

5. Recommendations (continued)

Provide for Rapid Change and Updating of the Standards by Replacing Them with Guidelines for Application of Information Obtained by Use of the Sophisticated Techniques Just Mentioned 32

Use a Panel of Information Professionals to Monitor Classification/Qualification Actions and Administer the Guidelines 32

6. Areas for Further Study 34

Appendixes

Appendix A: Table 1. Functions in Libraries/Information Centers 36

Appendix B: Background for Table 1 . . . 48

Appendix C: Interviews 70

Appendix D: Bibliography 71

1 - INTRODUCTION

The stimulus for this study was the indication that the Civil Service Commission (CSC) would be rewriting the classification and qualification standards in the GS1410 and GS1412 series in the near future. It was felt that a thorough examination and report on these standards from the perspective of librarians/information specialists would assist CSC personnel in the revision process.

Objectives decided upon were:

1) To explore conditions necessary to make the best possible match of individuals to library and information positions in federal agencies now and in the future.

2) To explore conditions that actually exist within federal agencies with respect to staffing in library and information positions and how these are affected by the qualification and classification standards.

3) To explore current and future developments in technology and in socioeconomic and political trends that will affect federal staffing in library and information positions in the future.

4) To recommend changes that would assist in approaching the ideal situation.

5) To summarize the description of conditions and the recommendations in a form that will be useful to agency administrators, library/information science personnel, and personnel officers, and to the Civil Service Commission. This summary should make clear the urgency for action to accommodate the order-of-magnitude changes taking place in the "knowledge industry."

The whole report attempts to accomplish the fifth objective. To carry out the second and third, a table has been created (see section 3 and Appendixes A and B) which lists functions included in the GS1410 and GS1412 classification standards, showing how they have changed and indicating new functions that are currently being performed by federal librarians/information specialists or will be in the future. The first objective is discussed in section 4, which covers use of the standards to match candidates to positions, and the fourth is addressed in section 5, Recommendations.

The explorations carried out make it evident that a simple rewriting of the standards is not what is needed. A totally new approach is required for two reasons: 1) information has increased in importance and information technology has developed into a management tool, particularly useful to the largest management organization in the country, the federal government, and 2) the probability of continuing expansion and rapid change in information handling makes it necessary to provide for constant updating of personnel controls.

To quote from Toffler:

> "Today change is so swift and relentless in the technosocieties that yesterday's truths suddenly become today's fictions, and the most highly skilled and intelligent members of society admit difficulty in keeping up with the deluge of new knowledge -- even in extremely narrow fields.
>
> "'You can't possibly keep in touch with all you want to,' complains Dr. Rudolph Stohler, a zoologist at the University of California at Berkeley. 'I spend 25 percent to 50 percent of my working time trying to keep up with what's going on,' says Dr. I. E. Wallen, chief of oceanography at the Smithsonian Institution in Washington. Dr. Emilio Segre, a Nobel prize-winner in physics declares: 'On K-mesons alone, to wade through all the papers is an impossibility.' And another oceanographer, Dr. Arthur Stump, admits: 'I don't really know the answer unless we declare a moratorium on publications for ten years.'" (1)

Obviously no moratorium will be declared. The information revolution, heralding the new post-industrial society, is here to stay. By now, according to some predictions, approximately half of our Gross National Product is derived from the "production and distribution of knowledge." (2,3,4) In other words, we are more dependent on information than on materials, transportation, etc. If no moratorium is to be declared, we must look at new ways of sifting the information to be delivered to the ultimate consumer, of "selecting a manageable volume of relevant information out of the abundant wealth of raw materials." (5,6)

Libraries and information centers must adapt to the new needs or they are doomed to obsolescence. (7,8) One

danger signal is the emergence of the "information broker" who has appeared in the United States during the past few years. (see Appendix A, 5.5) He is an independent agent responding to specific information problems of his clients. He answers questions for individuals who do not have ready access to a library/information system or for librarians/information specialists who cannot staff for questions outside their usual scope or for occasional crises.

The fact that he has come into existence outside the current library/information structure suggests that those within the structure have not always been satisfying the information needs of all their potential audiences. If the user of information does not find adequate help within an organization or doesn't know he can get it there, he will search for it outside. The need for information will persist and a new breed of information professionals will endeavor to supply it, but whether the traditional library/information center provides the setting or becomes merely a warehouse or faces extinction will depend on its adaptability.

Within federal libraries/information centers, success in avoiding obsolescence requires recruitment and retention of the best librarians/information specialists, adaptation of their assignments to the changing information needs, and facilitation of their efforts at solving emergent problems. It is to suggest ways in which federal staffing can meet this challenge that this report is written.

It is based on interviews with a number of federal librarians, information specialists, and personnel officers (see Appendix C), and on an analysis of current classification and qualification standards, current federal staffing levels, the new Factor Evaluation System and pertinent literature. It contains a statement of problems, an analysis of current and changing functions, a discussion of the operation of current standards, recommendations for new approaches to standards and staffing, and an outline of areas for further study.

Besides the expanding importance of information and rapid change already mentioned, the report emphasizes the need for adequate recognition of combinations of subject and functional backgrounds in library/information center staffing, the problem of inflexibility of recruitment from within and outside the federal government, partially caused by lack of a "critical mass" of library/information specialist personnel actions in any single agency, and the need to coordinate library/information science education with changing requirements.

2 - THE PROBLEMS

The problems that gave rise to this report do not result solely from the operation of the classification and qualification standards. They are symptomatic of stresses in today's rapidly changing and extremely complex information world that affect operation of the standards. Examples of specifics are:

1) A national library could not recruit to a GS15 position one of the most well-known information science practitioners in the country, a past president of national information associations. He had had twenty-five years of government and private-sector experience in libraries, information centers and publishing firms. During the last ten years, he was vice-president or president of companies in which he managed large operations under tight production deadlines which involved more than 100 employees, a large proportion information professionals. His salary had exceeded the GS15 entry level compensation. The fact that the most recent experience was with services and publications for libraries rather than in libraries enhanced his value to the recruiting organization for management of its resource development program, a position which required direction of tasks similar to those in all of his past experience. The interpretation of the qualification standards did not allow him to be qualified for the position. One reason given for rejection was that a MLS in library science earned in 1950 was too old. Evidently his experience was not recognized as pertinent. Later, the decision was reversed, but long after the candidate had taken another job.

2) A recent attempt to find a GS9 with chemistry background on both the GS1410 and GS1412 registers yielded no candidates in spite of the fact that the GS1410 register had been closed because of the large number of candidates on it. When the employer went to the Civil Service Commission to review the registers himself, he found eleven candidates with fourteen hours of chemistry or more, including one GS7 with thirty-six hours of chemistry at the graduate level plus a master's degree in library science. To find these candidates, the employer reviewed four registers over nine months and went to the Civil Service Commission twice.

3) A field librarian could not be recruited to a position in the national agency library because she was classified at a level much lower than her peers in the central library in spite of the fact that she was doing comparable work. Though the standards downgrade field work as being directed by the central library, she had always been autonomous. Recently she has been able to use a network and to contribute her unique specialized competency to its data base, so that the impact of her work is equal to that of an information professional in the central library. Her department head has not seen fit to promote her beyond the GS9 because she is the only information person with whom he has worked and he is unaware of the skills required for her performance. He did not have difficulty in recruiting her initially because, at that time, she was restricted to the geographic area of the field office.

4) In a single agency, under a single administration, people are being retained in the technical information specialist series (GS1412) in spite of the fact that they are doing the same work as incumbents in the librarian series (GS1410) because they have been able to hold higher grades for the same work in the GS1412 series.

5) An information center manager spent many hours and wrote eight pages of comments in refutation of an agency classifier's evaluation of a position description. She analyzed in detail the degrees and levels awarded to the various facets of the position in order successfully to raise the classification of the position from a GS11 to a GS12.

At the core of all the specific problems is the recurring theme that information is rapidly changing and becoming the most important element in the national economy. While librarian/information specialists and nonlibrarian/information specialists alike are willing to accept that fact, nobody is quite sure what it means for the traditional librarian or technical information specialist. At present each is answering his individual agency's needs in ways that may or may not be traditional, but are not necessarily like those followed in any other agency. Some libraries/

information centers are deeply involved with management information systems and others are not. Some information centers are staffed with professionals from the GS1410 or GS1412 series and others are staffed with personnel in a variety of other series. Some agency library/information centers have been delegated the agency responsibilities under federal reporting or freedom of information legislation and others have not.

Each situation is handled individually, but every agency library/information center has been affected by the changes in importance of information and each is operating differently than it did when the qualification and classification standards were written in 1966. That difference in operation is the major reason for each of the five example problems listed above and for the myriads of others that could be added. What is desperately needed is the opportunity to find creative solutions to new situations, to move flexibly among the alternative paths that could be followed. Presently that is difficult or impossible.

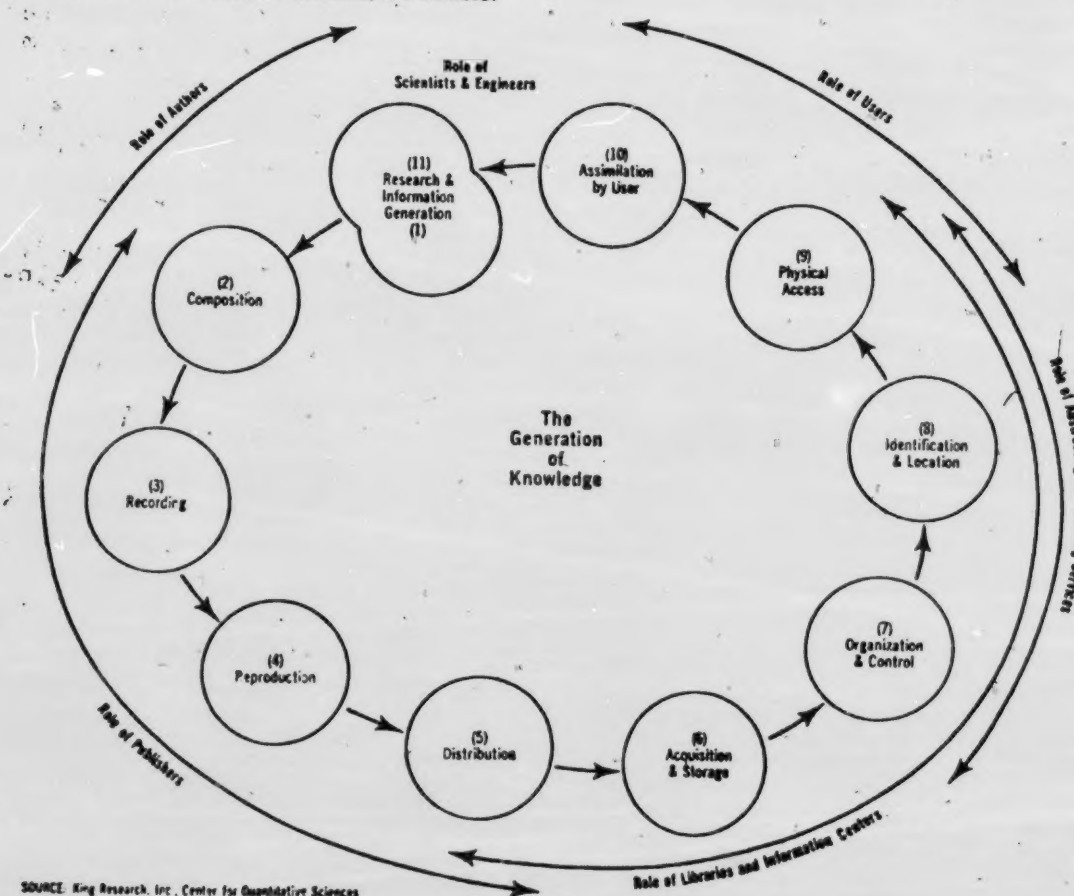
Aspects of the listed problems are more fully discussed throughout the remainder of this report. Some other important staffing problems will not be considered. Many are omitted because they are universal in federal staffing and are being studied by other groups. Examples are downgrading (9), personnel ceilings (10), amd failure "to measure such important qualities as personal initiative, motivation and creativity," (11,12) or to adequately recognize "skills, knowledges, and abilities of the present work force." (13) Other problems are left out because they are issues of equal or more importance in nonfederal libraries (e.g. certification (14,15,16)) and thus not directly related to the classification and qualification standards.

3 - ANALYSIS OF CURRENT AND FUTURE LIBRARY/INFORMATION CENTER FUNCTIONS

Though the problems listed in the last section instigated this report, its most positive contribution may be the analysis of current and future functions performed in libraries/information centers that is contained in Table 1 (Appendix A) and the background notes to it (Appendix B).

In order to consider the functions systematically, we have used the "knowledge cycle" familiar to those who have worked with transmission of information in science and technology. (Figure 1, 17, 18) In addition to listing each function performed, Table 1 indicates its treatment in the current classification standards, how it is presently carried out in federal libraries/information centers, and how its performance may change in the future. Finally, effects the changes in the function may have on the knowledge and skills requirements of an individual doing it are considered and suggestions made for revision of current standards to adapt to the new trends.

Figure 1
Scientific and technical information transfer



SOURCE: King Research, Inc., Center for Quantitative Sciences

Some new and different duties and procedures encompassed within the functions are mentioned in Table 1, but no attempt is made to be comprehensive. Two other recent studies present lists of duties and distinguish between those that are professional and ones that are clerical. (19, 20)

This section describes the technological and socioeconomic changes that are affecting the library/information center activities in Table 1 and summarizes the conclusions that can be drawn from a review of Appendixes A and B.

Technological Changes

The two most important advances for libraries/information centers are in computers and telecommunications, with their combination into networks providing the payoff. In addition, microforms are reaching their prime as storage media. Eventually they will be replaced by cost-effective machine storage of full texts and telefacsimile transmission of original copies will be as routine as telecommunication of bibliographic references is today.

Taking the advances individually, in 1973 Hopewell projected "the number of general-purpose computers will increase threefold, and the percentage using communications, which has risen from 25% in 1970 to 37% in 1972, is expected to increase to 70% by 1980. Over a tenfold increase in the number of terminals is expected during the same time period, growing from 300,000 to 40,000,000." (21) Among many other predictions, Vagianos prophesies that in 1985-1987 there will be "home computer terminals using the telephone network; computerized consumer optimization aids; computer-controlled artificial organs." (22)

Nanus describes five information revolutions: language, writing, mass media, the computer, and "the marriage of telecommunications and computers." (23) Similarly, Grosch discusses four generations of library automation.

> "The initial generation comprised the largely experimental use of Hollerith cards and hard-wired card-processing machines. The second generation involved the move to the digital computer in a batch processing environment for defined applications such as circulation, book ordering, accounting, serials listing and check-in. The third generation brought a wider integration of applications capabilities and dependence upon online data entry, updating, and output using IBM 360/370 generation computers. The emerging fourth generation consists of widely integrated applications systems supported by online computer systems oper-

> ating in either network or stand-alone environments.... By the eighties we will undoubtedly see the emergence of a fifth generation of library system, one dependent on computer-to-computer communications tying various levels of individual libraries to networked systems in new and increasingly flexible ways." (24)

These networks of computers can be expected to carry out three functions which impact on federal library/information staff requirements: "bibliographic production (the processing of machine-readable tapes produced by the national libraries into by-products required by the local institutions);" "service uses (recording holdings, making referrals, managing interlibrary loans, searching data bases, performing interactive searches of bibliographic and abstract files, etc.);" and "management and accounting function of network operation, including intersystem payments of suppliers of information." (25, 26)

> "Scientific bibliographic information systems are following a trend that will eventually result in a comprehensive, international, cross-disciplinary and integrated data resource that will be accessible to individuals through single access points." (27)

At the same time, microforms, first used for space saving and cost reduction, have come into their own as integrated storage components of systems. "In the best systems this has been accomplished in such a manner that the end user is barely aware of the microform itself...." (28) "As paper costs are increasing, the move toward film output listings, hard copy printing on demand of specific information, and record examination via CRT terminal will increase. Three years ago, the cost of storing catalog entries on disk online was on the order of thirty-five to fifty cents each. In 1976, these costs are now under five cents each..." (29)

The increased use of microform thus affects selection, acquisition, cataloging, storage, and distribution of materials, frequently reducing the load of clerical work per document, but increasing the need for ongoing policy decisions and review.

> "Microform will be the prime storage medium for large bibliographic files for at least the next decade. Beginning in the 1980's, machine readable digital storage will begin to be cost competitive with paper and microform. Gradually, digital, machine readable file storage will replace present day file techniques. The probable sequence will be numeric data files first, then bibliographic surrogate files (indexes before abstracts), and ultimately full text files." (30)

At about the time that we are working with machine-readable digital storage of full text, we can anticipate that facsimile transmission, already available to those organizations that are willing to pay for it, will be competitive with mail delivery through the post office, (31-33) with yet further dramatic consequences for acquisitions and sharing of materials, reflected in turn in selection, acquisition, circulation, and storage functions.

To summarize technological effects on library/information center functions, all are affected by automation and networking. Those most closely allied to local operations may use local "turnkey systems" that have been purchased from and installed by a vendor, but the "heyday of computer systems run for individual libraries has passed...." and joining national networks "is the wave of the future." (34)

Socioeconomic Changes

Though changes in information technology may be somewhat more dramatic and are certainly easier to predict, those in the socioeconomic field (2-4, 35) have equally important impact on library/information center practices. One author suggests "...we cannot easily forecast the effect of economic factors which would allow us to quicken our pace of development or force us to stroll. Nor can we guess the magnitude of the role of staff organizations, by diverting funds to salaries, in limiting the institutional ability to invest in technology." (36)

Saunderson puts the major problem succinctly: "The paradox facing the information field is that its users are pressing for extensions to its services whilst its resources are being increasingly limited." (37) As costs for materials -- including books and periodicals -- and for labor are spiralling, costs of information technology are declining dramatically. Increasing costs have made necessary sharing in collection development in libraries/information centers at the same time networking capabilities have made it possible.

Three other socioeconomic forces also influence the direction of the library/information center of the future. They are advanced management techniques, the pressures of consumerism, and the rapid increase of available information itself.

Advanced management techniques will be discussed with the summary of observations from Table 1. Little needs to be said here about the recurrent theme of information increase, but it should be reiterated that as traditional education

patterns are less adequate, demands on libraries/information centers increase. Speaking of college education, Luberoff states that the half-life of "the undergraduate education of an engineer class of '45 was 14 years. The class of '65 became obsolescent faster, half-life 2 years. And in the '70's we see an apparent negative half-life." (38)

Consumerism affects the internal library staff who insist on participatory management, (39) is demonstrated in demands by laymen and others in the private sector for access to information in federal files, (40) and culminates in freedom of information legislation. In turn, such demands raise issues of "right to privacy" and copyright.

Freedom of information legislation can influence the librarian/information specialist's responsibility for the agency's archives -- the quantity of requests he receives and the format in which information is delivered. With respect to the right to privacy, among many aspects, one is that "the sensitive nature of patron files which are necessary in order to locate and retrieve circulating materials cannot be ignored. The question of privacy is difficult to resolve even within a single organization; it will take considerable time before a solution to this problem is reached." (41-43) Similarly the copyright legislation just taking effect in 1978 will require precise and accurate record keeping, responsibility for careful monitoring and assessment of activities, and new policies and decisions.

While these developments may not have an enormous effect on federal staffing and new job requirements, each in its way adds to the complexity and responsibility of individual jobs. Perhaps a clearcut National Information Policy (44) will help to clarify long-range effects.

Finally, the socioeconomic changes discussed and many others are leading to more interest in the social sciences and more social science content in even the most technical library. And whereas once the primary use of libraries/information centers was for research, they are now extensively involved in education, practice, and management.

Impact of Technological and Socioeconomic Changes on Information Functions/Conclusions from Table 1

A careful review of the analysis of information functions in Table 1 shows:

-- All traditional information functions are changing rapidly.

-- There is a move along the information cycle from functions involved with collection and organization of information to those concerned with its assimilation -- sifting, interpreting, educating -- and a consequent need for communications and behavioral skills. This need is as closely linked to the individual who is to use the information as it is to the content of the documents that carry it.

-- There is an increased demand for subject as well as functional knowledge as emphasis moves from acquisition to dissemination of information and duties go from partially routine to fully professional.

-- There is a blurring among various parts of the knowledge cycle, with consequent involvement of librarians/information specialists in all parts, including production of information products.

-- The use of networks and resource sharing reduces the quantity of professional work per item handled, but increases the function's overall impact.

-- With the above changes, there is an order-of-magnitude increase in the responsibility of the library/information center manager.

The new role of the manager results from all of the increased pressures of technological and socioeconomic change, and from the many hard decisions that must be made when managing for increased services with reduced budgetary resources. In directing increased functions with reduced staff, the manager has five choices: to abandon a function entirely, to assign it to the computer, to share it with other libraries/information centers (probably through a network), to contract for it to be done by a broker or other outside organization, or to delegate it to a technician within his own group. The last choice has been endorsed as a means of more efficient management by many authors. (45-47) Though the library technician series (GS1411) is not directly addressed in this report, almost every function in Table 1 emphasizes the changes that are taking place as routine work is delegated away from the professional.

To choose among the alternatives just enumerated, the manager needs expertise in at least three major areas: systems analysis, standard and guideline setting, and contracts management. The skills related to systems analysis will help him evaluate the various functions and the relative costs and benefits of the different alternatives. In

working with networks and resource sharing, it will be necessary to create precise standards and guidelines. Needless to say, careful staffing for higher level functions will also require detailed attention to position descriptions or other future delineations of job functions and requirements. In addition to the ability to negotiate, contracts management requires a thorough knowledge of objectives and ability to focus the efforts of the contractor on those objectives as well as on the specifics of the project.

The key to the new management approach is the management of services, with resource allocation dependent on the purposes of the individual services and those purposes, in turn, dependent upon the mission of the agency. The library/information center carries out the agency's mission both directly through work with the agency's clientele and indirectly through applying information in the activities of the agency staff.

To accomplish these objectives, the new manager must have total flexibility to adapt to new opportunities and challenges in technology and politics and he will increasingly engage in participative management to take advantage of the total pool of abilities within his group. He will find himself adopting "new management styles (that) will develop under the impact of information technology." (48) Just as an example, for instance:

> "There are several policies which will significantly alter the adaptability, responsiveness, and effectiveness of government institutions and at the same time contribute to the long-run goals of discovering much more about how our society works. One particular development is intimately bound up with information processing technological advances: the need to establish, maintain, and support agencies or extragovernmental institutions for the objective evaluation of government programs.... Lower costs of gathering, storing, retrieving, and processing information should contribute significantly to our ability to perform such evaluation. Without better information, without some attempt to clarify objectives and goals, without some knowledge of how programs are performing, it is hard to see how complex systems can ever adapt or learn except by dumb luck." (48)

Thus the manager of a library/information center of the future will not only manage information, he will use information to manage.

4 - MATCHING THE APPLICATION TO THE JOB AND CIVIL SERVICE COMMISSION PLANS FOR CHANGE IN THE PROCESS

The previous section analyzes current and future staffing requirements of federal libraries/information centers, but it does not address the question of how these requirements can be met. No matter how well we keep standards up to date, we will not have successful federal staffing unless the matching process -- linking individual to requirements -- is effective. The following model (Figure 2) has evolved from a review of the process and discussion of it with federal librarians/information specialists.

"THE MATCHING PROCESS"

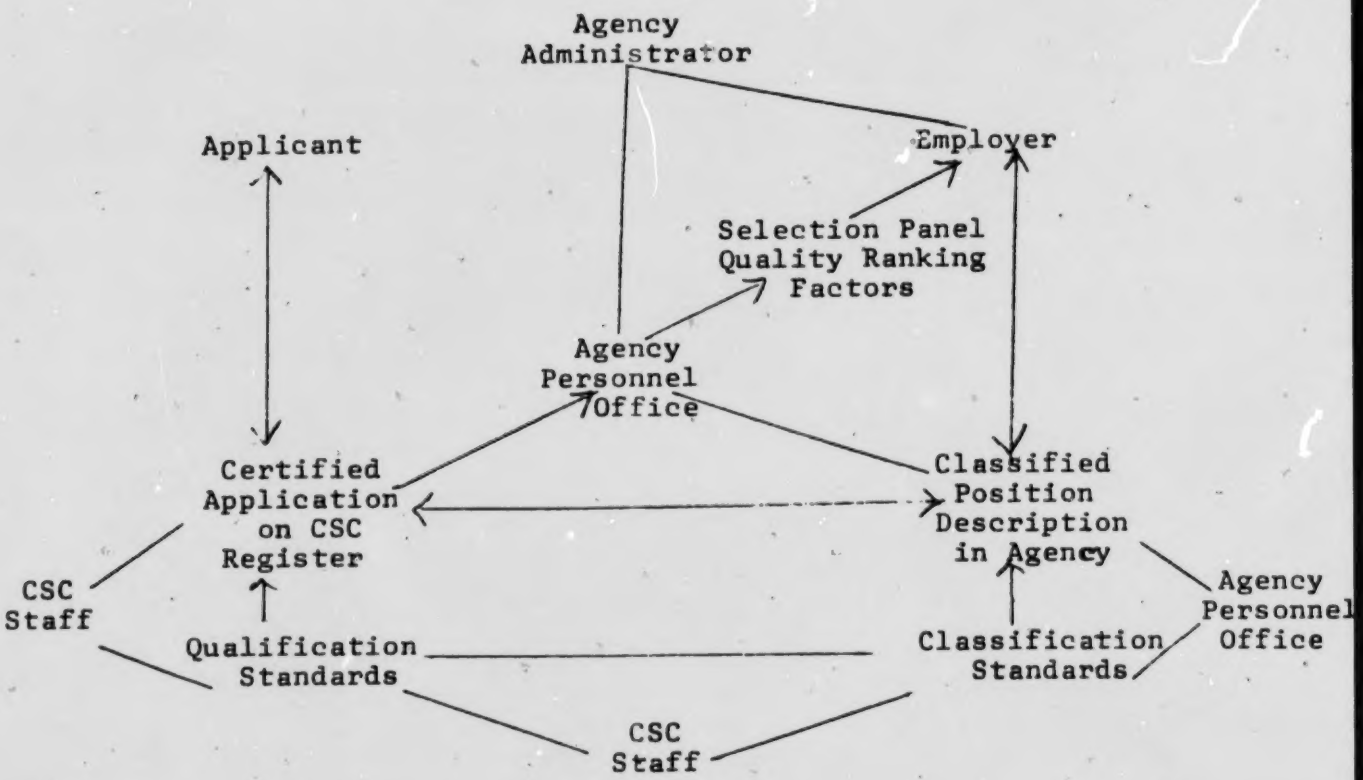


Figure 2

As indicated by the statement of problems, there are a number of places in which the matching process breaks down:

1) The position descriptions are frequently outdated and do not make clear actual requirements.

2) Classification by the agency personnel office is rigid because most personnel officers do not classify librarian/information specialist positions frequently enough.

3) The guidelines for classification under present standards do not allow for enough discrimination among requirements (but may be improved by the new Factor Evaluation System).

4) The qualification process is not precise enogh to sift out the best applicant from among others who have similar general qualifications.

5) Impediments in the matching process make it difficult or impossible to recruit from outside the federal government.

1) Position Descriptions.

Since the most constant clement in federal library/information staffing today is change, any library/information center that is keeping pace has outdated position descriptions if they are dated before 1975. Thus good position description writing is becoming increasingly essential.

At present, when library/information jobs are unfamiliar and the GS1410/1412 classification standards infrequently used, it is difficult for the personnel officer to interpret what is in the mind of the librarian. As in Problem 5 on page 5, the librarian/information center director must not only write very careful and explicit position descriptions, based on his own thorough reading and understanding of the classification guide and standards and the Factor Evaluation System benchmarks when they become available. He must also assist the personnel officer in interpreting the standards. It is necessary to make position description writing a well defined management function within the library/information center. The better the communication between librarian/information center director and personnel agent, the better the classification matches the concept of the position by the librarian.

2) Too Few Library/Information Center Personnel Actions.

Problem 3, page 5, demonstrates, among other things, the lack of "critical mass" of library/information center personnel actions by a personnel officer.

The total number of federal librarians/information specialists is around 4,500. Of these, around 1,200 are in the GS1412 series and over 3,300 in the GS1410 series. (49) Approximately 75% of those in the GS1410 series are in special, educational, or the national libraries -- which could be roughly equated to special libraries (50) and, by definition, those in the GS1412 series are in special libraries or information centers. In other words, there are over 3,600 special librarians/information specialists in the federal government. This figure can be compared with the Bureau of Labor Statistics estimate that the number of special librarians in the United States would rise from 17,000 in 1970 to 22,500 by 1985. (51) Federal librarians evidently constitute at least a fifth of all special librarians.

The term special librarian covers a wide range of specializations. Within federal libraries, the range is from pure science libraries in an organization like the National Bureau of Standards, through biomedical libraries in the National Library of Medicine, National Institutes of Health and other health and welfare libraries/information centers, to groups with high emphasis on the social sciences, as in the Departments of Labor or Housing and Urban Development. Though these libraries/information centers are special in that they serve a specialized clientele, they represent a wide range of subject coverage. For any particular kind of special library, there are probably not more than a few hundred professional librarians in the same subject field throughout the United States, and in most areas, the federal component numbers fewer than one hundred. Of the 64 agencies in which the 4,500 individuals in the GS1410 and GS1412 series work, half employ five or fewer people in either or the series and only ten have more than one hundred employees in the two series combined. (52)

The training of those in the GS1410 series is usually an M.L.S. from an accredited library school, but the subject specialization learned as an undergraduate or on the job is very different for each area of specialization. Thus the federal librarian/information specialist is one of a few dozen specialists in his particular kind of federal library/information center within a core of a few hundred librarians/information specialists in the field throughout the country. In a few fields, like medicine and law, the total number will run into thousands, but not to tens of thousands.

If we accept the Bureau of Labor Statistics figures, only 300-400 special librarians will be added to the labor supply each year, and we assume fewer than 100 of them will go into federal libraries/information centers. Thus in a

typical situation, a personnel officer sees fewer than a half dozen GS1410/1412 personnel actions or position descriptions in the course of a year. With normal turnover, this means that most personnel officers lack experience with the two series. When standards are unfamiliar, they tend to be interpreted conservatively. Although there are many other fields in which the number of professionals in government is no larger than for librarians, the usual case is for the incumbents in the series to be concentrated in one or a few agencies, whereas librarians/information specialists are spread throughout.

In our recommendations, we suggest that classification might be carried out by a librarian/information specialist panel who would be more familiar with the problem.

3) Guidelines for Classification and the Factor Evaluation System.

Though there are not as yet any benchmark position descriptions in the GS1410 and GS1412 series, those who have looked at the new Factor Evaluation System in relation to positions in the two series feel it will be extremely helpful. The factor evaluation criteria (draft dated January 1976) appear to make possible a more equitable classification than does the old Guide for the Classification of Positions Providing Professional Library and Information Services. The addition of more levels within factors in the new FES adds to the clarity and understandability just as does breaking the requirements into more different factors.

The FES gives more weight to knowledge requirements than does the Guide (Factor 1 in the FES and Factor 3 in the Guide). The new FES does not, however, allow explicitly for the generalist who has knowledge and experience in a variety of fields -- strengths essential for most information professionals. Good benchmark position descriptions may be capable of solving this problem, but it would be better to break the knowledge requirements into two factors -- one for knowledge of subject content and one for knowledge of functional (library/information science) content. Further, there should be explicit recognition for breadth of knowledge, such as that which would be gained by a second baccalaureate or extra courses in a second subject -- so often required in library/information center positions. Means of analyzing this breadth of knowledge are discussed in the recommendations.

Factor 2, Level of Responsibility in the Guide, is much better covered in the new FES by Supervisory Controls

and Guidelines, plus the factors for Personal Contacts and Purpose of Contacts. Separating these factors should make possible much more clear and straightforward classification.

Probably the greatest improvement in the FES is the substitution of new factors on Complexity (Factor 6) and Scope and Effect (Factor 5) for the previous Scope of Assignment (Guide Factor 1). Whereas the former tended to deal with resources, setting, etc., the latter much more appropriately looks at mental requirements for the position being classified.

In the Guide, the statements about the collection in Degree A of Factor 1 and Degree a (2) of Factor 2 tended to downgrade the experience of a field or branch librarian. (See also Problem 3, page 5.) With the advent of networks, a field librarian's work can have just as much impact as that of many library personnel in central agencies. Also, field librarians operate essentially independently and often deal with highly specialized subject matter and highly trained clientele. Experience in these positions can be very valuable, and the best way to evaluate it is on the basis of what it has added to the individual's knowledge, as the new Factor Evaluation system does.

The FES also is more complete and flexible than that recently reported for academic libraries, (53) except that the latter gives added credit for personnel supervision or coordination. Many staff in small and medium-sized libraries/information centers have supervisory responsibilities which -- though not of sufficient magnitude to be considered under the Supervisory Grade-Evaluation Guide -- add to overall position factors. These are not clearly recognized under the FES.

In all of the Factor Evaluation System, the wording is more direct and more easily understood than is that in the Guide. The benchmark position descriptions should not be allowed to become obtuse in their addition of specifics to the straightforward wording of the general statements.

In summary, the new Factor Evaluation System is a great improvement over the old Guide to Classification, but it can be further improved for purposes of library/information center positions by separating content and function knowledge and by recognizing breadth of function, knowledge, and experience as well as depth.

4) The Qualification Process.

Like the classification standards and Factor Evaluation System, the qualification standards are also much too general with respect to breadth of function, knowledge and experience,

especially combinations of content and function background. The need for this combination, expressed throughout this report, is in conflict with a basic principle of current standards, that the primary or major function is the controlling one, with only secondary emphasis for additional subjects or functions.

The qualification standards and the announcement both indicate that "a few positions at all grade levels may require knowledge of particular subject matter areas." (Professional Careers for Librarians, Announcement No. 42, April 1977) Although the announcement says: "In some cases, advanced graduate education or professional work experience in a specialty area may be considered in determining the grade level for which an applicant qualifies," the qualification standards are not explicit as to how additional credit is given for a combination of subject and function background.

That the current qualification process is not working well is also shown by the problem of the CSC's not being able to find a chemist on the GS1410 or GS1412 registers in spite of the fact that the potential employer proved that they were there. (Problem 2, page 4.) The Civil Service Commission shows awareness of this difficulty by the fact that they use an "Occupational Supplement for Professional Positions in Library Science - 1410," which contains far more specifics than are listed in the qualification standards themselves. Even so, the CSC is in process of revising it. Mr. John Pugh kindly supplied the proposed CSC Form 1203 - B, August 1977, which is reviewed briefly here. (There is no corresponding supplement for the GS1412 series.)

Though the language list appears to be adequate, functions and subject specialities do not yet obtain sufficient information for the matching process. Though somewhat more useful than those listed in the qualification standards in Title 5, most of the subject-matter specializations listed in part 15 of the Occupational Supplement are at a high level in hierarchies which could be much more specific.

One way of discovering meaningful specifics is to look at the groups of special librarians who band together. Within the Special Libraries Association's divisions and sections, for example, are the following groups not represented in the subject-matter specializations listed in item 15: aerospace, chemistry, environmental information, food, geography and map, insurance, metals/material, military, museums, arts and humanities. This does not include small groups that have

banded together independently in such fields as: planning, labor, health sciences audiovisuals, and health administration. There are no doubt many more.

A way of keeping a list of subject specialities up to date and of applying them in recruitment is discussed in the recommendations.

The list under "Specialized Job Tasks and Functions," Item 16 on the Occupational Supplement, is interesting for several reasons. The items are even less closely related to the specifications in the Title 5 qualification standards than are the subject-matter specializations. It appears that they have been considerably edited to take care of newer functions or skills ("briefing skills"), specific functions not readily identified on the Qualification Standards list (page 1) ("bibliotherapy/patient education"), or functions unclear in that list and therefore deleted ("reference"). The Occupational Supplement list still lacks many of the newer functions listed in Table 1 of this report (e.g., most of those under assimilation), some that fit more closely into the GS1412 series, but are often library functions (developing terminology controls, Table 1-2.6), and specifics (retrospective searches, Table 1-3.3.1).

Also, skills and functions are listed together in item 16. They should be separated and listed in more detail. In addition to briefing skills, technical writing and writing/editing skills are there, but other communications skills, behavioral skills and many more that can be found in Table 1 are not listed.

Finally, in the Occupational Supplement, isolation of 13, Computer applications, and 14, Audio-visual equipment, is probably outdated. In the case of computer applications, it is understood that the systems librarian will know a lot about computers, but the type of knowledge required now is different from that demanded 5-10 years ago. With respect to audio-visual equipment, the differences involved in work with audiovisuals extend far beyond operation of the equipment as implied in Table 1, and equipment operation is relatively trivial in comparison with other needs from the media librarian.

Improvement in the qualification process could be made by using sophisticated information handling techniques, guidelines for their application, and a panel to monitor them, as recommended in the next section.

5) Impediments in Recruiting from Outside the Federal Government.

Turning to employing candidates not presently in the federal system, the first problem described earlier -- that of recruiting a nationally known figure to a GS15 position -- was partly due to the lack of flexibility in the qualification standards and in their interpretation, but it also resulted from difficulties in the use of the registers for recruiting nonfederal candidates.

One excepted agency librarian interviewed had recruited three-fourths of his professional library staff from outside the government in the past decade, while the corresponding figures for nonexcepted agencies appear to around one quarter recruits from the private sector. If these figures are correct, they suggest that nonexcepted federal agency libraries/information centers are missing a large part of their primary staffing pool. Though the problem is not limited to libraries, it may be more urgent in them because of the small number of candidates in the library/information specialist market discussed earlier.

To obtain candidates from outside the government at all, a frequent practice in nonexcepted agencies is to "name request" (54) an individual who has been recruited directly. The success of this procedure depends on the number of candidates in dispersed geographic locations. (If there are many candidates in similar jobs throughout the country, more people from remote areas are apt to have their names appear on the register and not to be interested in positions in the Washington area. Hence someone "name requesting" in Washington stands a reasonable chance that individuals on the register will not be interested in coming to the area to take the position, and the potential employer will be able to employ the person he "name requests.") The evidence of acute difficulty in getting employees from outside the federal government when the most precise pool of candidates is very small emphasizes the need for exact subject and functional analysis of the candidate's qualifications as discussed in the recommendations.

5 - RECOMMENDATIONS

As a minimum, the Civil Service Commission should pursue the actions recommended in Table 1 and update its classification and qualification standards to include the functions and skills covered there. It is evident, however, that much more extensive changes must be implemented in six areas before the problems approach solution:

1) Broaden the scope of the standards to include a broader definition of the field.

2) Eliminate the distinction between and combine the GS1410 and GS1412 series.

3) Emphasize the need for a combination of subject and functional education and experience.

4) Increase the precision of match between the job and the applicant through use of sophisticated information handling techniques.

5) Provide for rapid change and updating of the standards by replacing them with guidelines for application of information obtained by use of the sophisticated techniques just mentioned.

6) Use a panel of information professionals to monitor classification/qualification actions and administer the guidelines.

Each recommendation is discussed in turn.

1) Broaden the scope of the standards to include a broader definition of the field.

The federal role in information services is already much broader than that of the traditional library/information center. (55) The agencies are major publishers and are responsible for many data banks. (56)

With the rapid change in information, its technology, and its processing, it should not be surprising that there has been no general agreement among information scientists or librarians on the definition of the field. (57-61) The most precise study of the definition of information is Porat's The Information Economy: Definition and Measurement. (4) His definition used for deciding on what activities to measure is very broad:

> "Information is data that have been organized and communicated. The information activity includes all the resources consumed in producing, processing and distributing information goods and services." (4, p. 2)

Within this definition are included virtually all of the activities of the educator and two-thirds of those of the physician. The traditional functions of "Libraries and Information Centers" are explicitly listed under "Information Distribution and Communications Industries - Public Information Services." However, if one looks more closely at Porat's analysis of information technology as it relates to the primary information industries, one finds the functions of the librarian/information specialist spread throughout. A few examples are: "Library Technology: MARC Files, Bibliographic Search Systems, Mass Storage Media (Microfilm & Fiche)" under "Educational Technology Systems;" "National Wire Services and Information Brokers" under "Newspapers and Magazines," and "Information Storage and Retrieval" as a major rubric.

It is apparent that the functions performed by the librarian/information specialist cut across major parts of the information economy. Individual members of the group have been aware of the universality of their skills and functions for a long time as they have found their training in librarianship and information science useful in many activities far outside the traditional settings -- from running a management information system in an industrial organization to administering a Professional Standards Review Organization in a southern state. The knowledge and skills necessary for effective performance in a library/information center appear to be identical with those needed in a large proportion of information activities.

In a recent definition, Robert Taylor has found: "two elements of expertise that I feel an information professional needs to know: to be able to ascertain the information needs and information behavior of his market, and secondly to be able to design, implement, operate and manage systems, services and products responsive to those needs. Ideally these kinds of abilities need to be accomplished in a context-free environment." (62) Dr. Taylor says that there may be specializations of the information professional such as "computer systems, libraries, accounting systems, retrieval systems, telecommunications systems,"

but that he should "feel comfortable in publishing, libraries, records management, retrieval systems, the information industry, television and radio and those parts of large corporate bodies where the principle concern is organization and transfer of information." (62)

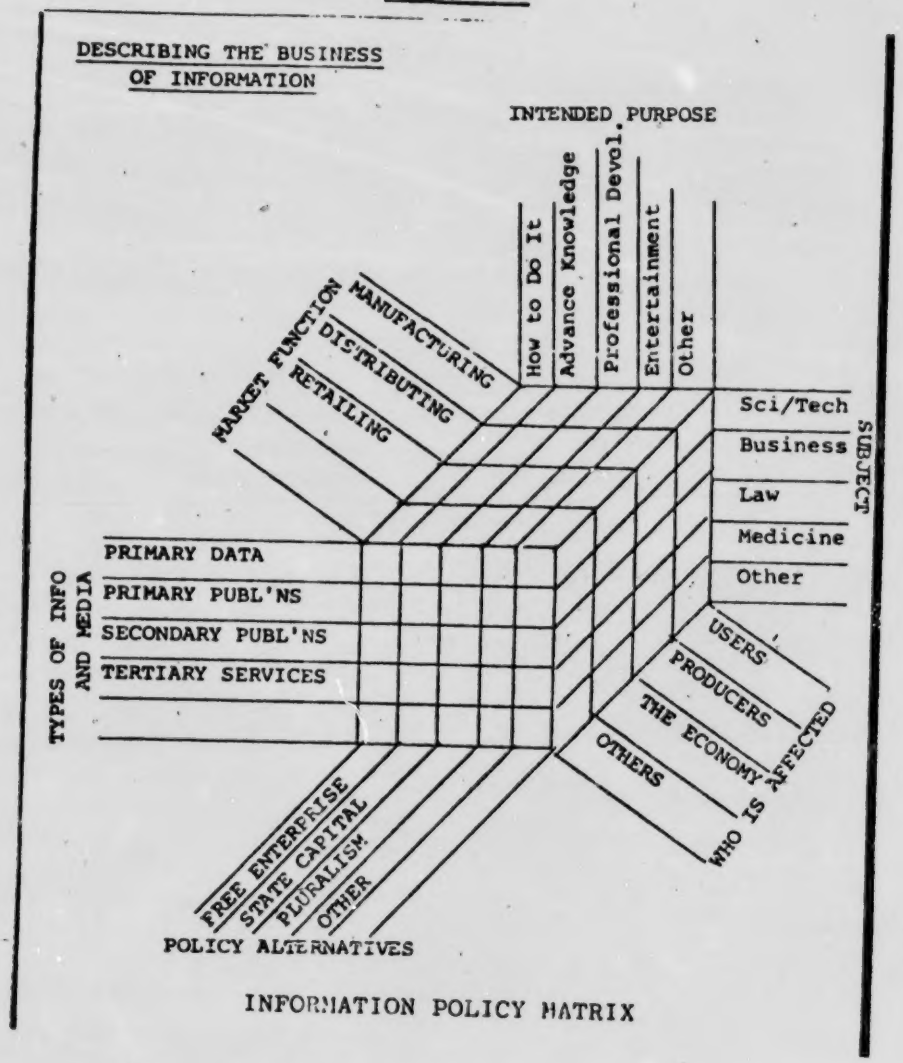
While this definition does not take in the whole of the information economy, it is much broader than that covered in the GS1410 and GS1412 series, which have specifically excluded parts of it. In spite of the exclusions, individual government information specialists and librarians have been carrying out many of the functions.

Before discussing further the implications of such a broadened definition, one should note the apparent conflict between Dr. Taylor's "context-free environment" and our emphasis that the information professional needs both functional and subject specializations. Dr. Taylor agrees with this report that the information professional is usually a generalist. Individual generalists may present all sorts of mixes of subject and functional knowledge and skills. In fact, the training of the information professional enables him to learn subject specializations much more easily than the person without such training. But he must learn them and a potential employer needs to be able to evaluate what he knows at the time he applies for a position. Thus Dr. Taylor's "context-free environment" could be interpreted as "multi-context environment" and include various combinations of the subject and functional knowledge and experience that might be required for a particular federal information position.

Dr. Taylor emphasizes: "...the profession presently scattered among a variety of groups -- librarians, computer specialists, information managers, journalists, systems engineers, and so on, must begin to look for similarities rather than differences. Little by little, I think this may be happening." (62) In the same vein, Margaret Saunderson, a British colleague, says: "...the information function has to be construed as encompassing far more than the library, the information unit and the reports centre... This perhaps somewhat controversial fact is gaining acceptance by managements and staff of the various component parts. They are coming to appreciate that in respect of decision making, information can for little longer be deemed to be divisable. All relevant information must be made available when it is required." (63)

From this statement, it is a short step to the remark, "Information is a significant by-product of everything government does," (64) and to the global views of the information business presented by the Information Industry Association in Figure 3. (65)

Figure 3



INFORMATION POLICY MATRIX

A broad view is also taken in major recommendations of the Commission of Federal Paperwork such as: "Use trained information specialists to design and review information requirements," "(Develop) information planning, budgeting and accounting guidelines... (and) new career, education, training and promotion opportunities and programs for information managers and specialists." (66) And finally information professionals are concerned with efforts to provide a coordinated national information policy. (67-69)

Though the evidence for a broadened definition is substantial, it is difficult to say precisely where the boundaries should be or whether they should be built up gradually

by continuing study or established by fiat. It is clear that the GS1410 and GS1412 series would be joined in an overall information category by groups so diverse as those involved with public information and publication (1081-1084, etc.), those involved with communications (391, 392), patents (1223), medical records (669, 675), operations research (1515) and many others. Including all such information functions in one broad category would make it easier for an individual to move from one specialization to another, wherever his particular mix was needed.

Education for librarianship/information science is now moving in the direction of this broadened definition. Even the American Library Association -- which takes a rather simplistic approach to librarians and specialists as professional library manpower in its statement of policy on Library Education and Manpower -- says:

> "Certain interdisciplinary concepts (information science is an example) are so intimately related to the basic concepts underlying library service that they properly become a part of the library school curriculum rather than simply an outside specialty. Where such content is introduced into the library school it should be incorporated into the entire curriculum, enriching every course where it is pertinent. The stopgap addition of individual courses in such a specialty, not integrated into the program as a whole, is an inadequate assimilation of the intellectual contribution of the new concept to library education and thinking." (70)

Many library schools now contain the word "information" in their names and a few have dropped the "library" part even though their graduates still take their places alongside more traditional librarians in the manpower pool.

A survey of curricula in information science (71) responded to by 70 schools (of which 47 were ALA accredited library schools and a number of others, also library schools) contained many clusters of information science subjects: introduction to information science, introduction to computers, theory of computing, library automation, theory of organization of knowledge, management in libraries, behavioral aspects, statistics, mathematics, linguistics, and many others. The study also noted changes from a previous investigation in just four years. In addition to the fact that the number of courses more than doubled, the authors note "theory and structure courses are replacing applications types. In our opinion, this indicates some maturing in the field." (71)

Other educators here and abroad have endorsed new directions for programs which in general parallel those being carried out and suggest great emphasis on newer concepts and issues such as: the universe of knowledge, production and publication of knowledge, planning and management, comparative and historical studies, data bases and their characteristics, etc. (72-77)

A recent criticism of information science education points out that "library schools house the majority of such programs," followed by computer-science departments, management and business schools, a few independent information science departments, and some information courses in academic departments. (78)

2) Eliminate the distinction between and combine the GS1410 and GS1412 series.

If the definition of information science is broadened as recommended, then the distinction between the librarian (GS1410) and the technical information specialist (GS1412) becomes meaningless. Problem 4, page 6 -- that of the agency which kept people doing the same job in both series in order to protect the higher classification of those under GS1412 -- illustrates the need to abandon the dichotomy to avoid inconsistency.

In the past distinctions between the GS1410 and GS1412 series have been made on the basis of their relative involvement with computers, their professional degrees, and whether the incumbents are generalists or specialists. Finally, as just noted, there appear to be discrepancies in ease of advancement between the two series. These distinctions are no longer valid and are inappropriate.

Online access to computers has made everyone in libraries/information centers a computer expert of sorts. During our interviews with librarians/information specialists and personnel officers, we found that if a position required a library degree, it went into the GS1410 series. If the emphasis was more on a subject degree, it was placed in the GS1412. One person interviewed was emphatic in his desire to give credit to the library science degree by having it recognized as the main component of its own series. However, as more and more recruits to the field are required to have both subject and information backgrounds and are trained in the broadened library/information science schools, the distinction is not necessary.

In the past, the technical information specialist has been a specialist -- performing one or a few functions in one or a few subject areas, and the librarian has been a generalist -- performing many functions in many subject areas. Obviously, there has never been a sharp division. Some technical information specialists perform more generalized functions than do some librarians. It is simply a matter of where each fits on a spectrum.

A generic framework of the information profession, developed at the University of Pittsburgh Conference on Manpower Requirements for the Information Profession, includes:

"1 Information Theorists/Scientists who are concerned with the laws, theories, philosophy, sociology, etc. of information science

"2 Information Systems Specialists who analyze information problems and design systems or networks for their solution

"3 Information Intermediaries who work between the decision-maker and the body of knowledge

"4 Information Technologists who operate, maintain and control information systems, their equipment and processes." (79)

It is evident that all of these functions are those of generalists with the exception of the information theorists/scientists. Thus most of the new breed of information professional would fit better with the librarian in GS1410.

A 1970 study showed that directors of four nonlibrary information groups had higher job classifications than the library director in the same agency, as listed:

	Director's grade	
Agency	Nonlibrary information group	Library
A	GS-16	GS-13
B	GS-14	GS-13
C	GS-17	GS-14
D	GS-15	GS-11 (80)

In a 1976 report (49) , one also finds a somewhat higher proportion of full-time personnel in level GS-13 and above in the GS1412 series (18% of all personnel) than in the GS1410 series (14% of all personnel). On the other hand, since the entry

level in the GS1410 series is GS-9 and that in the GS1412 series, GS-7, one finds a higher proportion of personnel in positions at level GS-5-7 in the GS1412 series (nearly 7%) than in the GS1410 series (less than 1%).

We can postulate two reasons for the greater possibilities for advancement in the GS1412 series: 1) The degree required for entry into the GS1412 series is a B.S., whereas for GS1410, it is an M.S. On the other hand, subject specialists in the GS1412 series are more likely to have obtained Ph.D.'s than are library science majors. 2) The importance attached to depth of specialization over breadth and variety makes it easier to advance as a specialist. Indeed, librarians not in charge of major libraries can probably be advanced more easily in the GS1412 series than in the GS1410 if a case can be made for their specialized knowledge of subjects or functions. As already argued, this is an anachronism because a generalist is what is needed today.

Finally, all of the functions performed in specialized information centers are also performed in some libraries. It has been pointed out: "Where the library was not providing an adequate level of service the demand for information support resulted in the proliferation of separate information facilities." (81, 82) The national Commission on Libraries report states: "Many Federal libraries do not enjoy the full support of their agency administrators.... In an effort to change this attitude, some libraries have changed their name from 'library' to 'information center'...." (25, p. 21) Even in the Guide for the Classification of Positions (page 11), there is overlap between the information center which judges "value, validity, and completeness of the information derived from experiments, research, development, test, and applications..." and the Library which "provides and interprets..." "informational materials."

From Table 1 it can be ascertained that there are no major functions in the current GS1412 series which are not in the GS1410 series as well. There is one subfunction that is not listed in GS1410 although it is in GS1412 -- that of abstracting and indexing -- but, in fact, librarians do perform this function as well. There are some materials-related functions in the GS1410 series -- e.g. selection, acquisition, and storage -- which are not covered in the GS 1412 area.

In short, the distinction has always been artificial and both series should be brought into the broadened definition discussed previously.

3) Emphasize the need for a combination of subject and function education and experience.

As has been stressed throughout this report, the information professional is an "exotic intellectual merger" such as those described by Toffler as "springing up all around the basic professions, so that we begin to find sub-groupings of bio-mathematicians, psycho-pharmacologists, engineer-librarians and computer-musicians." (1, p. 132)

From the specifics in the current standards, it is clear that even in 1966 we wished to have the subject specialist perform information functions and the librarian have subject knowledge. That combinations of subject and function training are becoming available is shown in a 1972 survey. In nineteen federal libraries exclusive of the three national ones, nine per cent of librarians were found to "hold double degrees" (library science plus another). (83) In 1976, a study of 72 university libraries indicated that "the number of subject Ph.D.'s enrolled in library schools has at least doubled during the past year" and 60.6% of Ph.D.'s with a subject degree employed in these libraries also had an M.L.S. (84)

Rather than ask for an information degree or a subject degree, employers will ask for both so that what is now needed is a means of identifying the individual's specializations in detail. This is discussed in the next recommendation.

4) Increase the precision of match between the job and the applicant through use of sophisticated information handling techniques.

To evaluate the breadth and depth of experience and knowledge of an applicant, one must examine backgrounds in four different areas: subject matter; functions; skills; and institutional setting. In each of these areas it is desirable to establish hierarchies so that the employer may decide the level of specificity that is needed and give weights to each area for a particular position. Hierarchies are probably more practical for subjects and functions than for institutional settings and skills, but they should receive consideration for all. To identify functions, Table 1 and a study being proposed by the Pittsburgh group (79) should be useful. The latter could also supply some useful subject-matter breakdowns. Others could be obtained from an independent survey or, more quickly, by an exploration of groups of like librarians who have banded together as discussed earlier. Information from the present GS1410 and GS1412 registers could also be analyzed.

One way to analyze these data would be to build on clusters such as the ones prepared by Belzer et al. (71) in his study of information science courses. (The ones Belzer presents would obviously have to be updated and refined.) Similar clusters would need to be prepared for subject areas.

An alternative way to get useable specifics for subjects would be to construct an intuitive hierarchy with the physical, biological, and social sciences and humanities at the top and then progressively more specific subdivisions.

For instance, under biological sciences, one might have medical sciences and then further subdivisions into health administration and health sciences audiovisuals, among others. Similarly, environmental sciences might appear under biological sciences and be further subdivided into such groups as air pollution. It is evident that many of the more specific occupations could fit into more than one hierarchy, as occupational safety and health might be placed in both the environmental science and medical science hierarchies.

Whether such a hierarchy were constructed intuitively, based on cluster analysis, or prepared by another method, it could be useful in evaluating an individual's experience for qualification in a position. The evaluation of both subject and functional background should go to the course level for education and to correspondingly specific aspects of experience, such as institutional setting and proportion of time spent on a particular function.

When preparing a position description and requesting people from the register, the librarian/information scientist would then be able to specify the individual category of subject and functional specialization needed.. He could also designate relative weights to be applied and how far up in a hierarchy he was willing to go as well as which upward category(ies) he wished to draw upon if a subject specialty fit into more than one. Similarly, it should be possible to request a specific combination of structure and function, e.g. cataloger in plant sciences, outreach personnel in mental health, manager of an environmental information center, and to give at least a minimum time for experience in the specified combination.

After extensive background preparation, a committee of federal librarians/information specialists such as that described in the last section could make some hard judgments as to relative weights to be given various kinds of credits, whether certain schools might merit higher weights than others, and the myriad other questions that would have to be ironed out before the system could actually be tested for selection of candidates. However, some method which evaluates background below the degree level is urgently needed if we are to be able to make rational qualification ratings in a field to which one can and should come with two different kinds of background as well as many different specific areas within each.

Most federal library/information center employers will agree that precision is more important than having a number of choices among individuals who may have only peripherally-

related experience and education. Though such precision in requesting a candidate might smack of "preselection," it would be better than "name requesting," which is evidently the only workable alternative for obtaining recruits from outside the federal sector when one has very precise requirements. After all, with dozens or at most hundreds of people working in a specific field, a hiring librarian is apt to know most or all of the likely candidates. It seems more fair for him to be able to check the register to see whether he has missed someone than to avoid the register and choose a less desirable candidate from the federal sector, as he does frequently now. Both candidate and potential employer benefit if the best person is found for the position.

5) Provide for rapid change and updating of the standards by replacing them with guidelines for application of information obtained by use of the sophisticated techniques just mentioned.

In dealing with rapid change, the more one can rely on general principles rather than specifics, the more easily one can keep pace. Perhaps the best way of accomodating to changes in information positions would be to replace standards with guidelines. Rather than listing the functions of the librarian/information specialist in a permanent standard, it might be wiser to say what criteria are used for determining hierarchies of subject and function specializations on a periodic basis. For example, a sampling of functions in representative libraries/information centers every three years might be subjected to cluster analysis or related techniques and the results validated by a panel of expert information professionals who are knowledgeable of future trends. Thus the listing of subjects and functions would be constantly updated. The guidelines would regulate how they would be applied, weighted, ratified, etc. *

6) Use a panel of information professionals to monitor classification/qualification actions and administer the guidelines.

Until there are many more information professionals, possibly under a broader definition, a possible solution to the lack of "critical mass" of library/information personnel actions in any given agency could be to delegate library/information specialist classifications to an interagency group of information professionals in order to get adequate experience with such actions. In Canada, where the problems are similar, the Treasury Board (equivalent to our Civil Service Commission) has delegated authority to classify positions in

* see p. 32a for insert

Insert to follow first paragraph of Recommendation 5, p. 32

There are already guidelines, of course, in the Factor Evaluation System and Guide for the Classification of Positions Providing Professional-Level Library and Information Services (TS 60, February 1966). One major difference from these would be that the elements in the proposed guidelines would go to the course rather than the degree level for education and to the task rather than the function level for positions, with correspondingly increased specificity in other areas.

A second major innovation would be that the new guidelines would provide formulas for mixing subject and information backgrounds rather than the individual weighting of a few specific characteristics used today.

Even more important would be the quantitating of job responsibilities and provisions for updating. With respect to quantitating responsibilities, the requirement for experience with online bibliographic systems would be weighted differently if ten searches per week were to be performed from a single data base for a small homogeneous group of scientists than it would be if the volume were one hundred searches per week to be performed on four or more data bases under a choice of three systems for over one hundred scientists in many fields. While some recognition may always have been given to this sort of difference, our proposal would be to find scientific methods of weighting and evaluating the elements by volume as well as level of activity.

As noted, the formulas for quantitating and evaluating job responsibilities should be updated regularly. For instance, in the example just used, the weights might change considerably if a "guide to data bases" became available online which facilitated transfer from one data base to another for an information specialist with minimal previous background.

the area of professional information services (among others) to Deputy Heads of Agencies. (85) In turn, there has been a subdelegation for Agriculture Canada to "Decision-making Heads." Anyone to whom this authority is delegated must have successfully completed a "Job Evaluation Course." (86) The "Instrument of Sub-Delegation of Classification Authority" states: "The most effective means to apply standards and achieve uniform classification decisions is through the use of Classification Committees." This Classification Committee may consist of decision-making heads from various departments or nominees who represent them.

The United States could consider following the Canadian model wholly or partially. One of three directions might be taken: 1) delegate the library/information service position classifications to inter-departmental or inter-agency panels representing librarian/information service heads; or 2) establish the classifying authority in the Civil Service Commission, where greater experience could be gained in library/information center position classifications than in a single agency personnel office; or 3) use a combination of 1) and 2) wherein expertise as a classification adviser is gained by a member of the Civil Service Commission staff, but authority rests with the interagency classification panel. It should be noted that this authority in Canada is subject to a general review and evaluation program, and that "Where a delegated Decision-making Head is represented at a classificaion committee, he may approve the committee decision or if (he) disagrees with the decision he may refer the case to the next higher level of management for decision."

If hierarchies of subject and functional background are to be established and guidelines for applying and updating them adopted, then a librarian/information specialist panel will be essential for implementing them. It would be logical for this same panel to monitor classification of position descriptions and any other major personnel actions that remain in a revised system.

6 - AREAS FOR FURTHER STUDY

This study is limited both by the prescribed level of effort and by the fact that it ends while the information picture is still changing rapidly. If a strategy is to be worked out for a coordinated attack on the staffing problems of federal libraries/information centers, further work is needed. Some of the study areas listed below are more important to the coordinated attack than others, but all have a place in improving federal staffing.

1) Subject and Function Hierarchies. As noted in the previous section, such hierarchies are essential to precise classication and qualification. Procedures are discussed in Recommendation 4. Such a study could also be used as a method of updating Table 1.

2) Information Activities in Other Series. If well structured, a natural part of the study suggested above could be a broadened definition of the information series. Functions being performed in libraries/information centers but presently classified in other series should be examined as should similar activities carried out outside present libraries/information centers. Particular attention should be paid to the Porat study (4) and to the work of the Commission on Federal , Paperwork (66) as starting points for collecting all appropriate functions.

3) Methodology. As data are collected it should be possible to test the relative effectiveness of various methods of analysis. It is quite likely that research will be necessary to refine the methods so that they can be used routinely in updating data for classification and qualification. In addition, the methods should take into account technological and socioeconomic forecasting and reports on such activities should be constantly monitored and used to validate the currency of the classification guidelines.

4) Titles. As a part of the studies listed in 1) and 2) above or as a separate effort, the titles used in practice, in the classification and qualification standards, in the Dictionary of Occupational Titles, and in Table 1 should be surveyed and analyzed for clarification, definition, and standardization.

5) Technicians. A study of the functions in the GS1411 series should complement the data collected in Table 1. Changes have occurred in the functions of the technician corresponding to those of the professional.

6) Position Descriptions should be collected and analyzed in detail with the purpose of clarification, definition and standardization of elements included and assistance to the manager who must write them. This project should be an ongoing one, preferably in conjunction with analysis of subject and functional requirements.

7) Educational Programs in Librarianship/Information Science. Programs in the various schools should be surveyed and recommendations made for inclusion of the knowledge and skills needed in federal library/information specialist staffing, frequent updating of curricula to conform with updating of the requirements, and ongoing provision of information on curricular changes to those working with updating of the classifications.

8) Federal Personnel Management Project should be studied with respect to the relevance of their various recommendations to problems in libraries/information centers.

9) Application of This Study. In addition to its use as input to the further studies listed above, this report will provide background material for revision of the GS1410 and GS1412 standards. To be most valuable, it should have wide circulation and ratification among librarians, information, specialists, personnel specialists, and managers in federal agencies.

If it is used primarily for the data contained in Table 1, models should be taken from the most advanced libraries/information centers. It is only a question of months until what is advanced today will be the norm!

However, if the recommendations are pursued, most could apply to any other profession which is undergoing rapid change, whose practitioners are scattered throughout federal agencies, and which requires both subject and functional specializations. Testing the recommendations on the library/information field could provide a prototype for others.

APPENDIX B

Background for Table 1

There is so much current material on the changing aspects of every area of librarianship/information science that it is impossible to include all supporting data in the text of this report or in Table 1. Even what is appended here does not nearly exhaust what is available. However, it should add useful explanations, detail, or supplementation for those responsible for any change or revision of the standards or guidelines to their use. The comments follow the major rubrics in Appendix A - Table 1.

1. Acquisition and Storage

Because of increasing costs, sharing in collection development is replacing expanding acquisition. Costs have increased because "the amount of literature written and distributed has increased substantially and the unit cost of communication has generally risen faster than inflation." (17, p. 8)

"The (science and technology) communication resource expenditure in constant dollars per scientist has increased from about $2000 in 1960 to $3000 in 1974 and is expected to remain about the same until 1980."(17,p.8) However, while the GNP grew 177 percent between 1960 and 1974, "S&T communication resource expenditures ... have increased by an estimated 323 percent." Principal reasons for the disproportionate growth are "that the amount of literature written and distributed has increased substantially and the unit cost of communication has generally risen faster than inflation." (17, p. 8)

"Scientific and technical books have exhibited the greatest rise from 3,379 titles in 1960 to 14,442 in 1974 (327 percent increase) and scholarly journal articles have increased from 106,000 in 1960 to 151,000 in 1974 (42 percent increase)." (17, p. 7) "The costs attributed to S&T journals rose from $1.3 billion in 1960 to $5.6 billion in 1974 (330 percent increase) while the costs associated with S&T books increased from $600 million to $2.1 billion during this time (over 250 percent increase). (17,p8) Putting it on an individual basis, White describes "the price increases for periodicals reported by American publishers and by the libraries responding to the survey. The price increases reported during the four-year period 1969 to 1973 by American publishers averaged 42.5%, for an annual rate of 9.3%." (88) Individual libraries consistently report even higher figures, probably because of subscription agency service charges and greater impact of price increases for journals published outside the United States.

Academic research libraries actually purchased 3.5% fewer books in 1973/74 than they did in the previous year. (89) Schmidt states that we should "raise up a new generation of administrators who are skilled in the process of adjusting to decline. Yet we know so little about decline that we are not even sure what these skills are." He speculates that some effects of management of decline will be "a change in priorities from ownership (holdings) to access..." which will allow "for major redeployment of staff..." and that "resource allocation will become less focused on acquisitions and more on personnel..." (89)

The shift in emphasis from ownership to access has major implications for the selection, acquisition, and interlibrary loan activities as indicated in Table 1. Schmidt emphasizes the changes in skills needed. "...as the priority shifts from ownership to access, quality and size of service staff become paramount. It is hard enough to provide prompt and precise access to materials owned. It takes ingenuity, wit and alertness to provide access to materials in other locations. Fortunately, as acquisitions decline, personnel can be shifted from work generated by acquiring materials to work involved in providing adequate access to unowned materials." (89).

As information technology has made possible more sharing than before, an individual library's selection of materials has regional and national implications. Martin mentions that materials selection has only recently been emphasized "in the national context. An increasing tendency of academic libraries to identify collection development as a task separate from acquisitions and reference has focused attention on the needs of collection developers, resource sharing, and collection development policies. Columbia University Library's 1973 automated shelflist analysis and the clearinghouse of the Research Libraries Group are pace setters." (36)

Urquhart points out that more selectivity on the part of individual libraries can increase the burden on national libraries by quoting an earlier study of Metcalfe: "One

final warning if we are to make mistakes, as we are bound to do. Let us try to make them, in the case of most libraries, by not getting enough, because the law of diminishing returns will come to our aid. But, and this is a large but, let us make the mistake on the side of getting too much in the National Libraries. The total cost to the library world of this method will be less, and nationally only a drop in the bucket." (128) These policies place greater responsibility on selecters in both kinds of federal libraries: the national libraries must assure themselves that they are finding everything important and the other federal libraries must be sure that they are selecting only those materials that are crucial in their daily functions.

But access to unowned material is not the only process affected by information technology. It can also influence the process of buying them. It is becoming possible to order at an online terminal copies of items whose references were just retrieved in a subject search.

> "During 1975 two data base producers, ISI and NTIS, simplified the document acquisition process for documents cited in their own data bases. In the case of ISI, on-line users of their data base through Lockheed or Systems Development Corporation (SDC) are now able to use the accession number to order full text of relevant items through ISI's Original Article Tear Sheet service (OATS). A specific command is provided for the searcher to order copies of desired items directly on-line through the system. The article order is subsequently transmitted to ISI headquarters in Philadelphia where the orders are filled. Ordered items are mailed to the requestor within 24 hours. A similar capability is available for on-line ordering of NTIS documents.

> "Possibilities for solving the document delivery problem include: (1) the data base producer's maintaining copies of all documents cited in his data base, as done by ISI and NTIS; (2) the developing for on-line searching of one or several union lists of serials with holdings information. Lists could be prepared on a national, state, or regional basis; (3) a national serials resource center functioning as a central depository. Any one of these solutions would simplify the problem of knowing where to find the document. The subsequent ordering can be simplified because we do in fact have a nation-wide communication network.... Facsimile transmission is used in cases where fast delivery is mandatory but this technique is still very expensive. However, if the National Commission were able to obtain lower communication rates for information transmission the expense would be reduced." (90)

Richard De Gennaro predicts: "The extension of these search services to include convenient access to documents in addition to citations could be one of the more significant developments that has occurred in library and information technology in the last several years. The availability of complete bibliographic access systems through online terminals would have a profound impact on traditional library acquisitions policies as well as on the future of scholarly journals." (91) Though he concludes "it is too early to assess the long-time significance of these developments," (91) Martin claims: "Libraries and information centers will be able to send vendors purchase orders in machine-readable form, either on magnetic tape (batch mode) or by using telecommunication (on-line). In return, vendors will submit in machine-readable form invoices which can then be processed not only by the library but also by its parent institution without additional keyboarding...." (36)

2. Organization and Control

In cataloging there have been three major developments:

cataloging in publication (CIP), establishment of the Ohio College Library Center (OCLC), and the closing of the card catalog in a number of resource libraries.

The card catalog will be closed in an increasing number of libraries, including the Library of Congress (129, 36) in favor of "a mixture of on-line, book, and microform catalogs." (36, 130)

> "As LC expands the scope of the MARC distribution, as more libraries become involved in cooperative processing, and as information centers and publishers share data throughout the community (as with the Cataloging-in-Publication (CIP) program), less original bibliographic description will take place at the institutional level. 'Shared cataloging' will increase. However, it is unlikely that there will be a sharp reduction in the number of technical processing staff required. In order to close out manual operations, a library must have little or no backlog, a relatively clean existing catalog, and flexible staffing patterns. Only gradually will most libraries find it possible to reallocate from technical services functions to either in-depth processing tasks, collection development, or public service areas." (36)

Cataloging-in-Publication is particularly useful to small libraries, since they receive information on call number, subject headings, etc., with the book and have only to copy it to reproduce cards for their files. When most of the books they acquire are from major publishers who include CIP, they will find that a great deal of their original cataloging has been done for them.

For libraries which process more publications or who acquire from publishers who do not supply CIP, the Ohio College Library Center (OCLC) network offers a solution.

De Gennaro finds OCLC "the most significant development since establishment of the MARC format and distribution service and (it) has achieved a commanding and well-deserved lead in the area of cooperative computer-based library networks." (91)

The Ohio College Library Center (OCLC) system is currently being used widely throughout the federal government and similar systems are available. OCLC allows a cataloger to access a data base consisting of Library of Congress MARC records and those for original cataloging in hundreds of other libraries. If he finds a record for a book he wishes to catalog, he may accept the cataloging that has already been done and merely add his own holding record or adjust the entry to suit his local needs. If he does not find the record, he does "original cataloging" himself so that the next cataloger looking for the same book in the system will have the first cataloger's work to use or change. Thus the original work of the cataloger is substantially reduced, and he can accomplish much more during the day, but when he does original cataloging, "the mistakes or 'sloppiness' committed by a cataloger will not be confined to the catalog of one library alone since the record input into a data base will be used by many other libraries. The consequences of a 'small' mistake in a cooperative cataloging data base can be extremely costly." (131)

Input by a variety of users will also mean that "there will be the records that, in sharp contrast to LC records, will need to be edited at the local level.... Updating the quality

of bibliographic records is not an insolvable problem, but it will take knowledgeable catalogers, with one eye on the ultimate use (and cost!) of their product, to do so." (132) Thus the local cataloger should be equivalent in training to LC catalogers and must make many individual decisions on whether to accept or reject the original cataloging of others. To make these individual decisions efficiently, he will need to create ongoing guidelines which will probably be more sophisticated than those needed when he was cataloging only locally.

Modern technology "along with related developments in cooperation and standardization, have rendered the catalog a much more sophisticated tool than ever before." (131) These new developments have led to reduction in number of catalogers in some organizations (133) and to speculation on the part of many catalogers as to their future roles. (134) "...some professionals should begin to consider related areas into which they would like to move." (135) "Local adjustment of copy is not automatic and requires constant policy guidance.... we should be able to assist patrons to use the catalog in ways which we could only dream about now." (135) "...we must begin operating in a new environment -- that of service -- and abandon local cataloging as a fine art, an end in itself. What we must do now is concentrate on access." (136) "As more people are trained to understand the machines and their capabilities for adding and changing access points, the more change I hope to see in libraries." (136) At the same time, these changes and the complexity of ac-

cessing the catalog in a variety of ways or needing to use an "old catalog" (the one that has been closed) and a "new catalog," will mean that "the catalog will need to be 'taught' to the public, both in terms of general use and in the search for specific items." (132) Since the load of the specialist in some particular aspect of cataloging (language or subject) may be reduced, we may wish to "spread a specialist-cataloger's assignment across acquisitions, collection development, cataloging and public service lines, in whatever combination would best meet the needs of the library." (132)

In abstracting and indexing -- organization and control of the contents of journals, etc. -- the federal government also plays a major role as producer of "many of the largest and most heavily used data bases." (90) In their creation, online terminals are now being used to facilitate input and editing, but it is difficult to predict the longer range effects of an OCLC-like cooperation among data bases. Martin prophesies that the "transfer of information from publisher to information center to library and/or library network will be a vital step, transforming the information process from an insular and repetitive series of tasks to an interactive and increasingly effective system." (36)

As a result of these changes, terminology controls are becoming more crucial as the indexer works online and may link to other systems. On the other hand, ability to search titles

and abstracts to find how terms have been used in practice makes vocabulary work more efficient and requires less time in the routine of locating the new terms in printed indexes.

Effects of possible use of federal data bases by laymen are discussed at the end of section 5, Appendix B, on assimilation.

3. Identification and Location

Under "Identification and Location" fall a wide range of tasks from sifting of the literature and its interpretation (discussed more fully under section 5 - Assimilation by User) on the one hand to Xeroxing a list of references under a subject in a standard bibliography or finding a book in the card catalog.

This range of activity has let to confusion in the present classifications in the definition of the term "search," as it is used in the GS1410, GS1411, and GS1412 series. While technical and professional aspects of "ready-reference" or "reference work" may overlap in the GS1410 and GS1411 series, this function at least appears at the higher levels in the GS1411 and the lower ones in the GS1410 series. However, the term "searching" is first seen in the GS1411 series at the GS3 level and is used with different intents through the GS7 level. On the other hand, in the GS1410 series, "literature searching" is said to be at an "intermediate stage between reference work and research," (CSC Librarian Series, p. 16) and in the

GS1412 series, it is described as a highly specialized function. Though the term "search" is frequently modified to describe different kinds of searches (for books on a shelf which might be slightly misplaced, or when the request slip may bear inaccurate information; for bibliographic data in trade journals; for possible new serial titles, etc.), the function involved is sometimes not explained (e.g. CSC Library Technician Series, p. 24, end of item 3) and the term "literature searches" is actually used (p. 26), although it is surrounded by expressions that may somewhat limit its importance. This loose usage should be eliminated in future standards.

In this report, whenever the term "search" is used, it implies most or all of the following: definition of the question; interpretation of the actual need based on function of the requester and the purpose for which the answer will be used; analysis of available resources; development of a search strategy relating the most cost-effective resources to the question and need; actual carrying out of the search strategy with modifications as necessary; evaluation of the answer with respect to suitability to the need, question, and requester; and presentation of the interpreted answer in the most useful form for that request. These functions are not explicit in either the GS1410 or GS1412 standards.

Further confusion appears with the advent of online interactive searching in which the highly skilled literature specialist operates a keyboard.

In the face of these confusing situations, two points need to be understood: 1) There are a number of routine aspects to identification and location of information of importance to library/information center audiences, which can be delegated to technicians and are increasingly being so delegated with consequent enhancement of the professional's work; 2) Since online searching involves carrying out the search strategy and modifying it as results are seen, keyboarding is entirely incidental to the high level intellectual analysis that is occurring during the process. Perhaps in the not-too-distant future, light pens or other mechanisms will replace the keyboarding, but whether or not this happens, the process is an intellectual one.

As with OCLC in cataloging, online searching capability overshadows all other new developments in literature searching -- be it retrospective, current awareness, or automatic dissemination searching -- and has created an order-of-magnitude growth in demand. In early 1972, MEDLINE (NLM's means of automatic access to its index to the biomedical periodical literature) was introduced. "The number of searches performed on the MEDLARS data base in the United States in October, 1973, (18,189), equalled that for the whole Fiscal Year 1971 (18,059." (137) By October 1976, the total number of searches performed was 45,254. (138) Martha Williams estimates that online usage of many data bases in 1976 reached 1,200,000 searches, up from 700,000 in 1974. (139)

"Online bibliographic information services are growing rapidly and costing less. There are now (1976) over twelve million unique bibliographic records available for online searching, and most of them, ten million, can be accessed through one network, TYMNET." (140) Cost predictions include that of McCarn that the drop in computer costs (35% per year), combined with the increase in labor costs of libraries (6% per year), produces 40% improvement per year in the cost effectiveness of computer systems. (141) All the federal libraries visited in this survey are actively using many online systems in their literature searching and are increasing the number of questions answered.

An early survey shows that 75.3% of the searchers initially selected for online work were "trained librarians or information specialists." 41.1% were chosen because of familiarity with one or more of the data bases through coding for batch searches or manual searches of the printed product. Familiarity with computers or automation and the "right personality" were other reasons for selecting personnel for online searching. The "'right'personality seemed to include the searcher's having a high level of communication skills and being able to conduct a good reference interview with the end-user." (142)

Those managers who said that some searchers performed better than others listed the following requirements as important for a searcher:

"reference, data base, or subject background in the area in which the bulk of the on-line searches are performed

"a logical, thorough, analytical mind" (142, p. 52) Other characteristics of a good searcher, mentioned by a few managers, are "good memory, self-confidence, imagination, a sense of humor, and spelling and typing skills." (142, p. 52)

Williams summarizes the skills of the "intermediary" -- the "information specialist, information scientist or reference librarian" who mediates between "a user and the computer-based system" -- as handling "the intellectual tasks of: selecting the appropriate system and data base(s) for the user's question; negotiating the search question with the user; developing the query or profile with an effective search strategy; conducting the search; and possibly evaluating the output. Additionally, the intermediary cannot only maintain familiarity and experience with systems and their various features, data bases and vocabularies but he/she can keep up with the changes that are made in systems, data bases and vocabularies." (90)

The technological development of online searching of data bases has created a sociological revolution -- the use of information from these data bases by a far greater number than ever before -- but that is not the only sociological change in information retrieval. The rapid development of new fields of knowledge and the need for co-

ordination within networks (81, p. 147) have led to greater use of referral to an individual or center of excellence rather than to a publication. The consumer movement has extended the need for referral of individuals to sources of information and expanded the users of library/information center resources beyond the immediate agency clientele.

Federal Information Centers have been initiated throughout the country as a direct response to the need and demand of the layman for contact with his government. (94) While the primary emphasis of these centers is on the referral function, a natural extension of this activity is performance of reference work, finding answers. When an inquirer asks for the Census Bureau to get the latest population figures for his locality, it may sometimes be more effective to give him figures from a published statistical source.

4. Physical Access

Physical access within a library/information center is largely a function of technicians and aids and of their management. The new dimension is that information technology makes possible access to materials from remote locations and in new formats, so that the manager and systems librarian have responsibilities for administering systems as well as personnel in this area. As noted in Appendix B, section 1, on acquisitions, providing access to unowned materials through interlibrary loan or otherwise is more diffi-

cult than when the items are owned, although much of this work can be done by skilled technicians under supervision. As will be noted in the discussion of the systems librarian, in Appendix B, section 10, an automated circulation system may be a stand-alone system with a minicomputer on location, rather than accessed through a network.

5. Assimilation by User

The long list of new jobs (functions) under this title in Appendix A illustrates the increased emphasis that is being placed on it. "The information explosion will thus be met by dramatically greater selectiveness, and that will have important implications for the distribution of attitudes, for the operation of political institutions." (143) Not only does the function of assimilation carry with it greater responsibility than in the past, but it requires far greater understanding of human behavior which, in turn, means that "as clients' needs and behavior change, members of the profession will be able to recognize these changes and modify their own behavior to conform to new demands much more quickly than has been possible in the past." (8, p. 18)

The "information broker" discussed in the Introduction is referred to as being similar to "information outreach personnel" in Table 1, 5.5. Williams defines the "broker" as "a person or organization that searches data bases on-line at another location or purchases data base searches from another center, for its own customers. The broker does not

process the data bases, but does provide search services from them." (90) In practice, brokers use many resources other than computerized data bases, and can be characterized by the fact that they a) use information resources -- such as libraries or referral centers -- which they do not own or manage; and b) they sell their services for a profit. Williams points out that their cost must be offset by an added value, which "may consist of: (1) augmentation, analysis, screening or interpretation of output; (2) know-how in effectively using other search services; (3) knowing where to go to find the appropriate service or data base; (4) document location and delivery; (5) reduction of the purchaser's need for additional personnel with specific skills where the need for such skills may be sporadic; and (6) reduction of the purchaser's need for equipment, e.g. terminals, readers, etc. where the frequency of use is not sufficient to support the equipment." (90) Obviously federal librarians/information scientists may frequently need and purchase or contract for the services of brokers, thus providing an added management option and responsibility.

A person very similar to the broker just described exists within the federal government. He is an outreach person much closer to the British definition of "information broker" than to that commonly accepted in America. He is simply a member of a team -- e.g. a health planning unit -- whose expertise is in both information gathering and counselling and the team mission. He works in the setting of the team, inde-

pendent of an organized information unit, though, of course, he takes advantage of library/information center resources. (98, 110, 111) Whether the activity is developed under the aegis of the library/information center or of the team in which the outreach person functions, there are a variety of subject areas and titles involved. Some are: clinical librarian, (106) literature chemist, (107) drug information specialist, (108) and health information specialist. (111)

Another major sociological revolution caused by information technology is about to occur in education and will expand the role of the information educator (Table 1, 5.6). "The changeability of the environment and the enormous, growing mass of knowledge are leading to a shift in emphasis away from attempting to learn what is known in anticipation of the possible later value, toward learning the means of finding out what one has to know when the need arises." (144) "In an era when the learning process may not be so tightly tied to the teaching process, libraries -- expanded and modified as enabled by new technologies -- could become the cores of educational institutions or of educational processes, inasmuch as they give individuals ready, selective access to learning 'packages' of various sorts...." (144)

Already we are seeing some of this development. As individuals are encouraged to become more involved in their governmental process (as members of Boards under Public Law 93-641, "The Health Planning Act," for instance), they will

require not only information for specific purposes, but background educational materials to prepare them for decision making. In a recent meeting of the Public Health and Health Administration Libraries Group of the Medical Library Association, two librarians reported becoming members of local Boards of Health Systems Agencies and attempting to satisfy the need for informational and educational materials by the Board of which the librarians immediately became aware. (145)

Librarians/information specialists are already educating laymen in another area of the health field, through the major patient education programs of the Veteran's Administration and other such projects. In some instances the function may extend to bibliotherapy, the use of books as a part of the patient's treatment.

Whenever the layman is involved, there is a need to repackage information in a form that is readily assimilable by him. This is a traditional activity of many departments and agencies within the federal government, but the home terminal will one day make information data banks as available to laymen as they are presently to scientists, social scientists and other professionals. The information specialist/librarian will inevitably become involved in assisting the layman in his use of these systems. Such aids as cross-references for laymen or tags to indicate levels (for high school students, for the intelligent college graduate) may have to be built into systems. The ways in which data banks can be made more readily

assimilable to a layman are many and too complex to discuss further here, but they are certain to be among the problems of federal information specialists in the not-too-remote future, and they will require new, high-level skills in education and communication.

6-9. Researching with Information; Composition; Recording and Reproduction; Distribution

The functions listed on the left-hand side of the knowledge cycle (Figure 1) have not traditionally been included among the functions of the librarian/information specialist. As indicated in the recommendation for a broadened definition of information science (Section 5), it is becoming necessary to include them as one function merges with another. Much more research is needed on current and future functions in this area.

10. Management of Information/Library Services

The management of the changing functions of the library/information center is discussed at the end of Section 3 of this report. Some important subdivisions of the management function which may often be delegated include: promotion of information services, scientific problem solving, contracts management, consortium/network management, general systems work, and planning. Most of these are self-evident or adequately covered in Table 1. However, more needs to be said about systems work and computer management.

In those federal libraries which provide major data bases, detailed knowledge of computers is needed. Otherwise, there is a range of systems functions from creating minor data bases or incorporating one's abstracting and indexing output into existing systems to the more usual participation in networks and understanding and interpreting of hardware and software to library/information center staff that is described in Table 1.

While libraries/information centers are turning to networking for some functions, they "install package minicomputer systems for others...." (91) "The question of who was to do library automation -- librarians or computer people -- was one of those burning issues of the 1960's which simply faded away.... At present, it is difficult to distinguish the computer people from the librarians as each has taken on the characteristics of the other and no one feels threatened any more. As a matter of fact, many librarians who chose to specialize in computer work during the heyday of the movement in the 1960's are reorienting their careers back to regular library work which they correctly perceive to be the main stream of the profession in the long run." (91)

"installation of successful automated library systems in the 1980s will require efforts and skills sufficient to task a team of specialists. The systems librarian will have to aid, assist in, and perform a range of tasks that include uncovering and documenting in detail specifications of the library's needs, writing watertight technical and acceptance test specifications,

jockeying those specifications into a contract that legally obligates a vendor's performance, and monitoring vendor progress and library staff readiness development up to and beyond the final installation day." (123)

11. Education/Training

Education of the user in the subject matter he needs is covered in Section 5.6 of Appendix A and 5 of Appendix B. As noted in Table 1, training on-site has increased greatly with the new information technology, particularly with on-line systems.

12-14. Researcher; Media Librarian; Archives Librarian

While important, the needs for these functions should be self evident, and they are covered in Table 1. It should be noted that the familiar school media librarian usually has background and training very different from that needed by a federal library/information center.

APPENDIX C

Interviews

Libraries/information centers visited were chosen to be representative of large and medium-sized national and other federal libraries. Two (ERDA and the Library of Congress) were excepted from CSC recruitment requirements and three (Interior, Veterans Administration and National Agricultural Library) have responsibility for many field libraries. Wherever feasible, personnel officers were interviewed as well as a library administrator. We are grateful to the following for taking time for the interviews and contributing constructively to this report:

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Parklawn Health Library	Art Carrol
Veterans Administration Central Office Library	Jim Hahn Claire Tedesco Charles Sadler
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